AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Previously Presented) A microfluidic device comprising:

a pump unit including:

a first joint surface;

a pumping mechanism including:

a pumping chamber having a diaphragm to which a piezoelectric element is attached,

a first throttle channel connected to one side of the pumping chamber, and

a second throttle channel connected to the other side of the pumping chamber, wherein pressure dependence of the first throttle is larger than pressure dependence of the second throttle so as to be capable of transporting fluid each direction depending on a nonsymmetrically-shaped driving wave form of the piezoelectric element; and

a channel that forms a flow path through which a fluid flows, opposing ends of said channel each opening to the first joint surface, said pumping mechanism being disposed adjacent to said channel and being configured to control a flow of fluid through said channel;

a channel unit including a second joint surface for being detachably joined to the first joint surface and a channel that opens to the second joint surface and is connectable to one end of the channel of the pump unit, and

a member for positioning the pump unit and the channel unit with respect to each other,

wherein at least one of a material constituting the first joint surface and a material constituting the second joint surface is an elastic material having a self-sealing feature.

2. (Original) The microfluidic device according to claim 1, wherein the elastic material having a self-sealing feature is a PDMS.

3. (Original) The microfluidic device according to claim 1, wherein the elastic material having a self-sealing feature has translucency.

4. (Canceled)

5. (Original) The microfluidic device according to claim 1, wherein the pump unit is structured by a pump portion including the pumping mechanism, and a sheet-like member that connects to the pumping mechanism and opens to the first joint surface.

6. (Previously Presented) A microfluidic device comprising:

a pump unit including:

a first joint surface;

a pumping mechanism including:

a pumping chamber having a diaphragm to which a piezoelectric element is attached,

a first throttle channel connected to one side of the pumping chamber, and

a second throttle channel connected to the other side of the pumping chamber, wherein pressure dependence of the first throttle is larger than pressure dependence of the second throttle so as to be capable of transporting fluid each direction depending on a nonsymmetrically-shaped driving wave form of the piezoelectric element; and

a first channel that forms a flow path through which a fluid flows, opposing ends of said first channel each opening to the first joint surface, said pumping mechanism being disposed adjacent to said channel and being configured to control a flow of fluid through said channel;

a channel unit including a second joint surface and a second channel opening to the second joint surface;

a member for positioning the pump unit and the channel unit with respect to each other, and

a sheet-like member including a third joint surface to be bonded to the first joint surface, a fourth joint surface to be bonded to the second joint surface and a connection hole for connecting the first channel and the second channel,

wherein the sheet-like member is made from an elastic material having a self-sealing feature and is detachably joined to at least one of the channel unit and the pump unit.

7. (Original) The microfluidic device according to claim 6, wherein the elastic material having a self-sealing feature is a PDMS.

8. (Original) The microfluidic device according to claim 6, wherein the elastic material having a self-sealing feature has translucency.

9. (Canceled)

10. (Previously Presented) A pump unit used for a microfluidic device including the pump unit and a channel unit that has a joint surface and a channel opening to the joint surface, the pump unit comprising:

a first joint surface for being detachably joined to the joint surface of the channel unit;

a pumping mechanism including:

a pumping chamber having a diaphragm to which a piezoelectric element is attached,

a first throttle channel connected to one side of the pumping chamber, and

a second throttle channel connected to the other side of the pumping chamber, wherein pressure dependence of the first throttle is larger than pressure dependence of the second throttle so as to be capable of transporting fluid each direction depending on a nonsymmetrically-shaped driving wave form of the piezoelectric element;

a channel that forms a flow path through which a fluid flows, opposing ends of said

channel each opening to the first joint surface, said pumping mechanism being disposed adjacent to said channel and being configured to control a flow of fluid through said channel, one end of said channel being connectable to the channel of the channel unit, and

a member for positioning the pump unit and the channel unit with respect to each other,

wherein a material constituting the first joint surface is an elastic material having a self-sealing feature.

11. (Original) The pump unit according to claim 10, wherein the elastic material having a self-sealing feature is a PDMS.

12. (Original) The pump unit according to claim 10, wherein the elastic material having a self-sealing feature has translucency.

13. (Canceled)

14. (Original) The pump unit according to claim 10, further comprising a pump portion including the pumping mechanism, and a sheet-like member including a channel that connects to the pumping mechanism and opens to the first joint surface.

15. (Previously Presented) A channel unit used for a microfluidic device including the channel unit and a pump unit, the pump unit being the type that has a first joint surface, a pumping mechanism, and a channel that forms a flow path through which a fluid flows, opposing ends of said channel each opening to the first joint surface, the pumping mechanism including a pumping chamber having a diaphragm to which a piezoelectric element is attached, a first throttle channel connected to one side of the pumping chamber, and a second throttle channel connected to the other side of the pumping chamber, wherein pressure dependence of the first throttle is larger than pressure dependence of the second throttle so as to be capable of transporting fluid each direction depending on a nonsymmetrically-shaped driving wave form of the piezoelectric element, the channel unit comprising:

a second joint surface for being detachably joined to the joint surface of the pump unit;

a channel that opens to the second joint surface and is connectable to the channel of the pump unit, and

a member for positioning the pump unit and the channel unit with respect to each other,

wherein a material constituting the second joint surface is an elastic material having a self-sealing feature.

16. (Original) The channel unit according to claim 15, wherein the elastic material having a self-sealing feature is a PDMS.

17. (Original) The channel unit according to claim 15, wherein the elastic material having a self-sealing feature has translucency.

18. (Canceled)

19. (Previously Presented) A microfluidic device in accordance with claim 1, wherein said channel unit includes a fluid reservoir that opens to the second joint surface and is connectable to a second end of the channel of the pump unit.

20. (New) The microfluidic device according to claim 1, wherein the pump unit is configured in the form of a pair of substrates affixed together and said pumping chamber, said first throttle channel, said second throttle channel, and said channel that forms a flow path through which a fluid flows being formed as cavities therein, one of said substrates having a surface which is said first joint surface and including through holes which are aligned so as to provide fluid communication pathways to said opposing ends of said channel that open to the first joint surface.

21. (New) The microfluidic device according to claim 20, wherein said diaphragm is configured as a wall of said pumping chamber and said piezoelectric element is attached to a side of said diaphragm outside said pumping chamber.

22. (New) The microfluidic device according to claim 21, wherein the first throttle channel is in the form of an orifice having a short channel length and the second throttle channel is in the form of a nozzle and has a long channel length.

23. (New) The microfluidic device according to claim 21, wherein said pump unit includes cavities formed therein so as to form a second pumping mechanism and wherein said one of said substrates having a surface which is said first joint surface includes through holes which are aligned so as to provide fluid communication pathways to opposing ends of a channel of said second pumping mechanism that open to the first joint surface.

24. (New) The microfluidic device according to claim 6, wherein the pump unit is configured in the form of a pair of substrates affixed together with said pumping chamber, said first throttle channel, said second throttle channel, and said first channel formed as cavities therein, one of said substrates having a surface which is said first joint surface and including through holes which are aligned so as to provide fluid communication pathways to said opposing ends of said first channel.

25. (New) The microfluidic device according to claim 24, wherein said diaphragm is configured as a wall of said pumping chamber and said piezoelectric element is attached to a side of said diaphragm outside said pumping chamber.

26. (New) The microfluidic device according to claim 25, wherein the first throttle channel is in the form of an orifice having a short channel length and the second throttle channel is in the form of a nozzle and has a long channel length.

27. (New) The microfluidic device according to claim 25, wherein said pump unit includes cavities formed therein so as to form a second pumping mechanism and wherein said one of said substrates having a surface which is said first joint surface includes through holes which are aligned so as to provide fluid communication pathways to opposing ends of a channel of said second pumping mechanism that open to the first joint surface.

28. (New) The pump unit according to claim 10, wherein the pump unit includes a pair of substrates affixed together and said pumping chamber, said first throttle channel,

said second throttle channel, and said channel that forms a flow path through which a fluid flows being formed as cavities therein, one of said substrates having a surface which is said first joint surface and including through holes which are aligned so as to provide fluid communication pathways to said opposing ends of said channel that open to the first joint surface.

29. (New) The pump unit according to claim 28, wherein said diaphragm is configured as a wall of said pumping chamber and said piezoelectric element is attached to a side of said diaphragm outside said pumping chamber.

30. (New) The pump unit according to claim 29, wherein the first throttle channel is in the form of an orifice having a short channel length and the second throttle channel is in the form of a nozzle and has a long channel length.

31. (New) The pump unit according to claim 29, wherein said pump unit includes cavities formed therein so as to form a second pumping mechanism and wherein said one of said substrates having a surface which is said first joint surface includes through holes which are aligned so as to provide fluid communication pathways to opposing ends of a channel of said second pumping mechanism that open to the first joint surface.